



# Optimal HbA1c Threshold to Predict Post-Operative Mortality

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Dear Editor,

We read the interesting article by Aydinli et al. (1) published in Turk J Anaesthesiol Reanim, in which the primary aim was to investigate whether the HbA1c value in patients with diabetes undergoing coronary bypass graft surgery (CABG) is an independent predictor of post-operative mortality and morbidity. The authors did not find HbA1c values  $\geq 7$  in patients with diabetes undergoing isolated CABG surgery to be independent predictors of post-operative mortality and morbidity. The importance of this article is related to the crucial need to be aware of the correctable factors associated with unwanted outcomes after CABG in patients with diabetes. This information can direct the attention of the surgeons and anaesthesiologists towards proper peri-operative management of these factors to improve the surgical outcomes.

We would like to thank the authors for their remarkable work. Furthermore, we would like to highlight some essential points that will not reduce the importance of this original research but may support the authors' aim and provide more information for future investigations.

The authors used an HbA1c threshold of 7% to indicate poor blood glucose control as this value was reported to be appropriate for evaluating high-risk groups. Other thresholds for HbA1c exist, such as 6.5% and 8% thresholds (2). However, a threshold of 7% is widely considered to be a reference indicator of good glycaemic control (3). If the authors use receiver operating characteristic (ROC) curve, they can determine other thresholds of HbA1c for mortality specific for their patients with an addition of more valuable information.

A recent meta-analysis reported that the HbA1c level in diabetics undergoing CABG is potentially associated with increased risks of all-cause mortality, myocardial infarction and stroke (4). However, this meta-analysis recommended additional clinical studies with larger sample sizes and longer follow-up periods. The authors stated that HbA1c  $\geq 7\%$  in patients with diabetes who underwent isolated CABG is not an independent predictor of post-operative mortality and morbidity. There is a statistically misleading basis for this finding. The authors compared patients with HbA1c  $< 7\%$  and those with HbA1c  $\geq 7\%$  and reported a significantly higher mortality when HbA1c was  $\geq 7\%$ . However, when they evaluated the predictors of mortality and morbidity, they used the overall HbA1c mean value and did not consider the categories of HbA1c (HbA1c  $< 7\%$  versus  $\geq 7\%$ ) for multivariate regression analysis.

One of the limitations of this study reported by the authors is that HbA1c levels were not considered along with fasting blood glucose (FBG) levels. We agree to report this limitation because the combination of FBG and HbA1c increases the diagnostic accuracy of these tests. Moreover, there may be a false interpretation of HbA1c values in the presence of iron-deficiency anaemia, renal impairment, excessive use of vitamin supplements, high levels of cholesterol and liver disease.

Overall, with a continuous increase in the global burden of diabetes mellitus (DM), HbA1c remains a reliable diagnostic and prognostic tool, aiming primarily to provide better care for patients and reduce the annoying outcomes of DM; however, further studies are needed.

## References

1. Aydın B, Demir A, Özmen H, Vezir Ö, Ünal U, Özdemir M. Can Pre-Operative HbA1c Values in Coronary Surgery be a Predictor of Mortality? *Turk J Anaesthesiol Reanim* 2018; 46: 184-90. [\[CrossRef\]](#)
2. Sherwani SI, Khan HA, Ekhzaimy A, Masood A, Sakharkar MK. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. *Biomark Insights* 2016; 11: 95-104. [\[CrossRef\]](#)
3. Santos JM, Favalaro RR, Lowenstein D, Sanabria H, Raffaelli H, Hershson A. Medium-term glycemic control in diabetics before coronary bypass surgery. *Medicina (B Aires)* 2015; 75: 277-81.
4. Zheng J, Cheng J, Wang T, Zhang Q, Xiao X. Does HbA1c Level Have Clinical Implications in Diabetic Patients Undergoing Coronary Artery Bypass Grafting? A Systematic Review and Meta-Analysis. *Int J Endocrinol* 2017; 1537213. [\[CrossRef\]](#)

## Author's Reply

### Re: Can Pre-Operative HbA1c Values in Coronary Surgery be a Predictor of Mortality

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Dear Editor,

We thank our colleague for the valuable commentary.

At the beginning of the study plan, we revealed the demographic differences of patients with HbA1c values <7 and ≥7. The statistical analysis revealed differences in gender and mortality between groups. Next, we aimed to determine the independent predictors that affect mortality and morbidity by further analysis. The HbA1c parameter was put into both categorical (threshold of 7) and continuous variables in logistic regression models. When this model was evaluated, HbA1c was not found to be an independent predictor, either categorical or continuous. In our study, HbA1c was shown as a non-categorical but continuous variable associated with mortality and complication in the tables (in other words, we investigated whether an increase of 1 unit of HbA1c was ef-

fective or not). The study findings revealed that the numerical value of HbA1c is not an independent predictor.

Furthermore, as our colleague remarked, the HbA1c value, which can be determined using ROC analysis, can provide valuable information about this patient population. However, the logistic regression models to be obtained in this study population by the threshold value to be obtained from this analysis may still lead to bias. However, as stated, the ROC value of this study population can be used as a reference in future studies.

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